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Glovebox Decontamination System

Nuclear Materials Technology Division

Throughout the US Department of Energy's Nuclear Complex, there are produced various surface contaminated metallic waste items ranging in size from nuts and bolts to endtire gloveboxes and miles of ductwork. These items, because of the radioactive surface contamination, may have to be disposed of as high-level transuranic waste (TRU). Disposal of items in this category is costly. Removing the surface contamination - either Partially to reduce waste category and subsequent cost of disposal, or fully to enable release - makes sense if the decontamination activity can be done rapidly and cheaply. Additionally, immediate reuse of some items may be enabled by decontamination.

Glovebox Decontamination and Volume Reduction System

Much of the metallic waste stream at Los Alamos National Laboratory (LANL) is comprised of ferrous metals, such as stainless or other forms of steel. One obvious target for minimization of this metallic waste stream, due to their large volume, is plutonium processing floveboxes. Glovebox disposal cost is primarily related to the level of contained contamination. By decontaminationg to Low Level Waste (LLW) activity levels (<100 nCi/g), glovebox disposal cost is reduced. Reduction in waste category has several other benefits. LLW-categorized gloveboxes have an immediate path forward for disposition; they may be disposed of in approved landfill sites. Additionally, decontamination enables the reuse of gloveboxes that arenot considered obsoledt by design. Gloveboxes with lower than TRU levels of contamination may be stored temporarily within the LANL Plutonium Facility and are therfore candidated for reuse. Occasionally therse gloveboxes may even be reused without facility disconnection and subsequent reconnection.

There are other benefits for carrying out the decontamination prior to disconnection from the facility in terms of a reduced risk to workers , the public, the facility, and the environment during subsequent handling and transport. For this reason, a portable decontaminated process has been developed which can be placed within the glovebox within the facility. The glovebox is then decontaminated in place prior to removal.

The decontamination technology at the heart of this system is an electolytic method. The process uses an electolyte solution brought into contact with the metal surface through which an electric current is passed. The contact witht the metal surface through which an electric current is passed. The contacted metal surface, acting as the anode, has a few microns of material stripped quickly and uniformly from it. This stripped metal contains the majority of the radioactive contaminants. The electolyte conditions are controlled such that thestripped metals and radioactive components are precipitated. These marerials are then seperated from the aqueous electrolyt solution by filtration. The solution is virtually unchanged in the processs and is therfore reused, resulting in no aqueous process wast. Thesystem is small, relatively inexpensive to manufactur, andquite robust. Multiple systems have been built and operated. The abvility to lcate the system inside the glovebox line allows operators to take advantage of the existing facility air-handling and contamination controls such that the decontamination activities can occur without the requirement for added personnel protection equipment.

Additionally, this technology is currently being investigated and implemented for the decontmination of verious other metallic wast items. The decontamination process is visually obvious, producing a surface with an increased luster and "new" appearance. One minute of contact time reduces surface contamination adequate to bring most glovebox surfaces to LLW criteria. Increased decontamination is achieved by increasing the contact time. The speded of the process allows for rapid decontamination of a glovebox. Rapid decontamination of a glovebox. Rapid decontamination of a golvebox without special facility requirements and without production of large secondary waste streams results in a process that is economically feasible.

Contacts: Doug Wedman, (505) 665-7140, dwedman@lanl.gov, Electolytic Decontamination Project Leader, TA-55 Plutonium Facility